



Evaluation of Speech Technology In Noisy Environments [SPINE]

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Speech Transcription Workshop, 16-19 May 00



Background

- Robust commercial and research speech recognition systems [SRS] available
 - radio, telephony, office system applications
- Considerable investment by sponsor community
- Military environments are noisy
 - high noise levels
 - degradation of human listening performance
 - variety of noises
- DoD Digital Voice Processing Consortium (DDVPC)

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The Problem

- Current SRSs not designed to operate under conditions of military noise
- Current assessments: limited evaluation in noisy environments
 - ONR technology assessment on COTS SRSs performed under office conditions [1999 ELB program office]
 - DARPA evaluations have not looked at performance under conditions of military noise
- Robustness of SRS technology in military noise environment is open question.

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Exploratory Evaluation

- Evaluation of current SRS technology under noisy conditions
- Controlled data generation in military noise environments
- Goal is to determine current state-of-the-art
- No “winners” or “losers”
- Planned transition path of results to military applications

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Possible Applications

- Voice controlled interfaces (e.g. wearable computers, C2 systems)
- Messaging
 - very low data rates for LPI and LPD
- Monitoring military communications
 - Secure and non-secure

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DoD Digital Voice Processing Consortium

- History: NRL has been representing the Navy on the Digital Voice Processing Consortium from its inception.
 - Founded by ASD (Telecommunications) as the Narrowband Voice Processor Consortium, 1972
 - Renamed the Digital Voice Processor Consortium by ASD (C3I), 1977
- Objective: Coordinate secure voice research, development, and planning between DoD activities.
 - Exchange technical information
 - Avoid duplication of R&D efforts
 - Assure interoperability
- Evaluate digital voice processors, algorithms, and modems, and make recommendations based on results.

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DDVPC Membership*

- Participants:

- NSA (Lynn Supplee, John Collura)
- Navy/NRL (Astrid Schmidt-Nielsen)
- Air Force RL/ERT (Terry Champion)**
- Army CECOM (Raymond Lau)**
- Joint Staff (CPT Patricia Solimene)
- DISA (Sam George, Bill Maloid)

*Visit the DDVPC web page at <http://www.plh.af.mil/ddvpc>

** not currently active

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DDVPC MELP Selection Tests

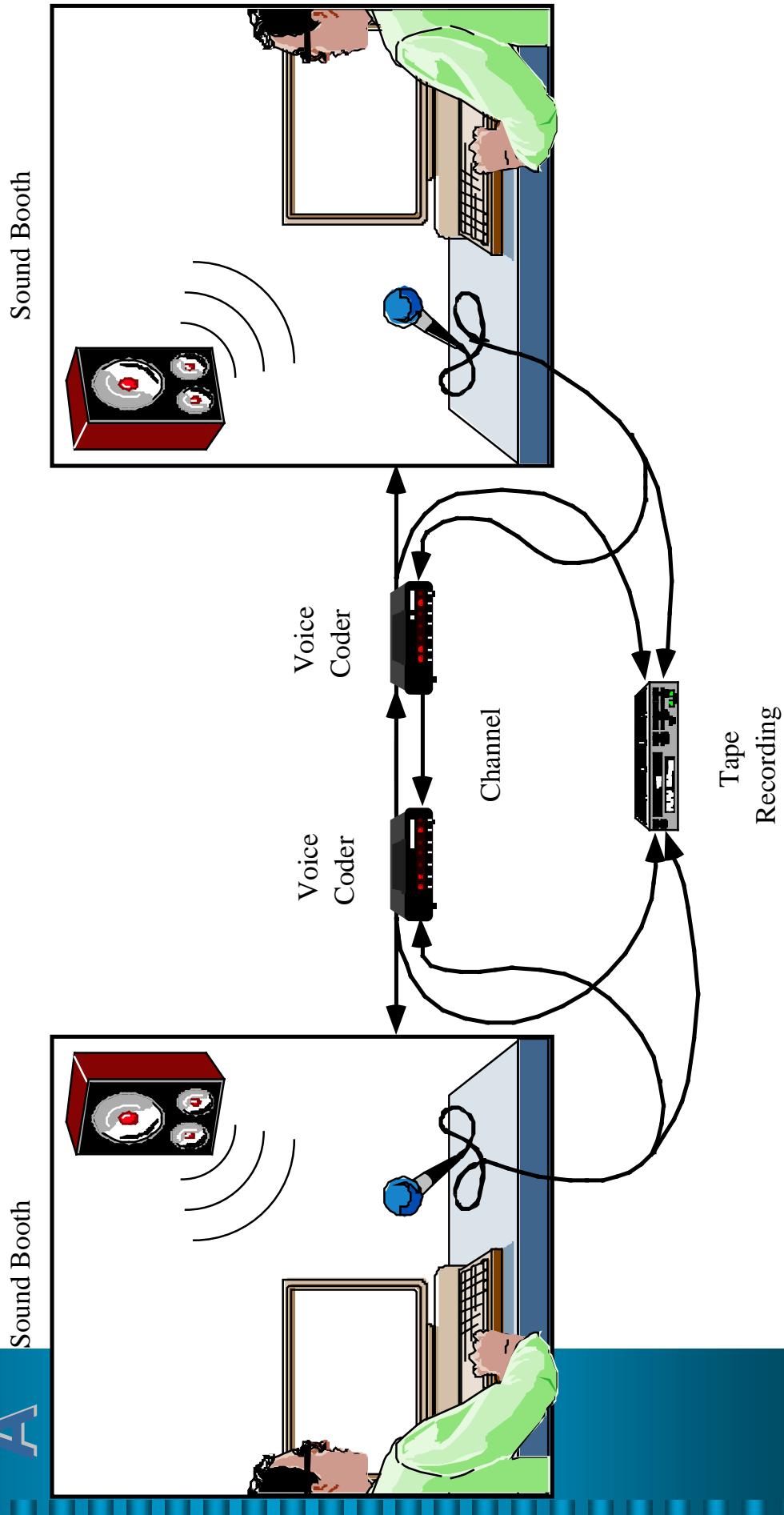
- Purpose: select a new standard secure voice algorithm at 2400 bps (1995/96).
 - Intelligibility and quality tests, many noise environments (e.g., airplane, helicopter, etc.).
 - Communicability testing, 4 scenarios.
 - Speaker recognition.
- Produced recordings of talkers in accurately reproduced military noise environments.

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Arcon Communicability Exercise (ACE)

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SPINE 1

- DARPA history of speech system evaluation
- Leverage Digital Voice Consortium participation and NRL voice interface for Marine wearable computers development efforts
- NRL management, data preparation, performance analysis, evaluation, and report
- SPINE 1 open to research and industrial participants at their own sites
- Small-scale evaluation in August 2000

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SPINE 1 (con't)

- Use current set of DDVPC scenarios
- Training data -- 10 talker pairs, 3 environments
- Test data -- 20 talker pairs, 6 environments
- Use of any DDVPC data outside that specifically provided for this evaluation is NOT allowed
- LDC data preparation and distribution
- NIST help with scoring

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Conducting SPINE 1

- CFP preparation and distribution
- Training and test data distribution
- Evaluation at participants' own sites
- Results returned to NRL via ftp for analysis

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Analyzing SPINE 1 Results

- Develop database of transcripts and results
- Conduct statistical analyses of results
- Evaluate experimental design, task, test results
- Plans for SPINE2

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Timeline for SPINE 1:

- 22 MAY 00:** Application deadline for participation
- 29 MAY 00:** Release of Part 1 of training data, transcripts, scorer, and other relevant information
- 19 JUN 00:** Release of Part 2 of training data, transcripts, scorer, and other relevant information
- 11-18 AUG 00:** SPINE1 Formal Evaluation
- OCT 00:** SPINE1 Workshop [tentative]

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Possibilities for SPINE2

- Additional noises
 - Other DDVPC noises
 - New noises, e.g. gunfire
- New scenarios
- Communication devices
 - Voice coders

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